

Chlordane

CAS No.12789-03-6 for technical grade

and

Heptachlor

CAS No. 76-44-8

General information

Chlordane is an organochlorine pesticide that was once used on agricultural crops and lawns and in buildings to kill termites. In 1988, the U.S. EPA cancelled registration for the production and use of chlordane in the United States.

The technical grade of chlordane consists of several related chemicals, including *cis*- and *trans*-chlordane, *trans*-nonachlor, and heptachlor. Chlordane is primarily metabolized to oxychlordane. Heptachlor (a separate pesticide) is metabolized to heptachlor epoxide. Chlordane is an unlikely source of exposure if heptachlor epoxide is found in the absence of either oxychlordane or *trans*-nonachlor. Because pesticide applications were generally made with technical-grade chlordane, it is the main form of exposure for people. During the period 1981-1982 in Hawaii, heptachlor was applied to pineapples that were subsequently fed to milk-producing cows. As a result, heptachlor appeared in commercial milk products, human breast milk, and serum (Baker et al., 1991).

Interpreting Levels of Lipid-Adjusted Serum Levels of Oxychlordane, trans-Nonachlor, and Heptachlor Epoxide Reported in the Tables

Generally recognized guidelines for serum levels of these metabolites have not been established. The levels for these chemicals in this NHANES 1999-2000 subsample are similar to levels measured in a control population during 1987-1990 (Sturgeon et al., 1998). For a control population from Canada (n = 70) collected in 1994, the mean lipid-adjusted levels of oxychlordane and *trans*-nonachlor were similar to the geometric mean level in the NHANES 1999-2000 subsample (Lebel et al., 1998). The 95th percentile level estimated from a non-random subsample of NHANES II (1976-1980) participants (Stehr-Green, 1989) was about two times the 95th percentile that is reported here. In another study, Wari-

ishi et al. (1986) reported that Japanese adults had geometric mean levels of *trans*-nonachlor similar to levels documented in this *Report* and oxychlordane levels that were slightly higher.

Table 160. Oxychlordan (lipid adjusted)

Geometric mean and selected percentiles of serum concentrations (nanograms/gram [ng/g] of lipid or parts-per-billion on a lipid weight basis) for the U.S. population aged 12 years and older, National Health and Nutrition Examination Survey, 1999-2000.

	Geometric mean (95% conf. Interval)	Selected percentiles (95% confidence interval)						Sample size
		10th	25th	50th	75th	90th	95th	
Total, age 12 and older	*	< LOD	< LOD	< LOD	20.6 (18.2-22.6)	34.4 (29.9-40.9)	44.8 (41.3-49.6)	1661
Age group								
12-19 years	*	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	663
20 years and older	*	< LOD	< LOD	< LOD	23.3 (21.0-26.0)	37.7 (32.7-43.5)	47.7 (43.5-50.6)	998
Gender								
Males	*	< LOD	< LOD	< LOD	17.8 (15.3-21.1)	31.2 (25.5-40.5)	42.3 (36.3-49.6)	793
Females	*	< LOD	< LOD	< LOD	22.3 (20.0-26.3)	36.7 (30.5-43.1)	46.1 (40.3-51.5)	868
Race/ethnicity								
Mexican Americans	*	< LOD	< LOD	< LOD	16.2 (<LOD-18.8)	28.9 (20.1-37.6)	39.8 (28.9-54.5)	628
Non-Hispanic blacks	*	< LOD	< LOD	< LOD	18.5 (<LOD-26.2)	39.9 (26.2-47.5)	47.5 (40.3-71.5)	350
Non-Hispanic whites	*	< LOD	< LOD	< LOD	21.8 (18.4-24.9)	34.1 (28.6-41.2)	43.5 (38.0-49.6)	559

< LOD means less than the limit of detection, which averaged 7.4 ng/g of lipid (SD 2.4, maximum value 14.5).

* Not calculated. Proportion of results below limit of detection was too high to provide a valid result.

Table 161. *trans*-Nonachlor (lipid adjusted)

Geometric mean and selected percentiles of serum concentrations (nanograms/gram [ng/g] of lipid or parts-per-billion on a lipid weight basis) for the U.S. population aged 12 years and older, National Health and Nutrition Examination Survey, 1999-2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% confidence interval)						Sample size
		10th	25th	50th	75th	90th	95th	
Total, age 12 and older	18.3 (16.9-19.7)	< LOD	< LOD	17.8 (16.0-19.8)	31.9 (29.0-35.5)	55.1 (47.4-65.5)	79.4 (67.9-86.8)	1933
Age group								
12-19 years	*	< LOD	< LOD	< LOD	< LOD	18.8 (<LOD-25.2)	23.4 (18.4-30.1)	664
20 years and older	20.8 (19.2-22.6)	< LOD	< LOD	20.6 (18.4-22.9)	35.2 (31.4-39.7)	59.9 (50.7-68.5)	82.2 (71.5-90.4)	1269
Gender								
Males	17.7 (16.4-19.2)	< LOD	< LOD	17.1 (15.0-19.3)	30.0 (27.1-35.4)	51.1 (45.6-59.2)	78.2 (60.2-88.1)	922
Females	18.8 (17.0-20.8)	< LOD	< LOD	18.4 (16.1-21.8)	32.9 (29.5-37.9)	58.7 (46.4-71.5)	80.8 (71.4-96.3)	1011
Race/ethnicity								
Mexican Americans	*	< LOD	< LOD	< LOD	25.0 (22.8-28.3)	40.7 (35.7-50.9)	55.9 (47.7-73.6)	650
Non-Hispanic blacks	20.3 (17.7-23.2)	< LOD	< LOD	17.5 (15.3-22.5)	35.7 (29.2-44.1)	77.0 (58.5-91.8)	106 (83.9-152)	404
Non-Hispanic whites	19.1 (17.4-20.9)	< LOD	< LOD	18.8 (17.2-21.6)	32.8 (28.9-37.1)	52.5 (44.0-65.5)	74.0 (63.6-85.0)	722

< LOD means less than the limit of detection, which averaged 7.5 ng/g of lipid (SD 2.4, maximum value 14.5).

* Not calculated. Proportion of results below limit of detection was too high to provide a valid result.

Table 162. Heptachlor Epoxide (lipid adjusted)

Geometric mean and selected percentiles of serum concentrations (nanograms/gram [ng/g] of lipid or parts-per-billion on a lipid weight basis) for the U.S. population aged 12 years and older, National Health and Nutrition Examination Survey, 1999-2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% confidence interval)						Sample size
		10th	25th	50th	75th	90th	95th	
Total, age 12 and older	*	< LOD	< LOD	< LOD	< LOD	15.3 (<LOD-19.8)	23.9 (16.8-35.5)	1589
Age group								
12-19 years	*	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	638
20 years and older	*	< LOD	< LOD	< LOD	< LOD	17.8 (<LOD-24.0)	27.1 (18.5-38.8)	951
Gender								
Males	*	< LOD	< LOD	< LOD	< LOD	< LOD	19.2 (<LOD-27.2)	760
Females	*	< LOD	< LOD	< LOD	< LOD	18.2 (<LOD-25.5)	27.0 (18.2-46.1)	829
Race/ethnicity								
Mexican Americans	*	< LOD	< LOD	< LOD	< LOD	15.2 (<LOD-21.4)	21.6 (15.3-46.5)	598
Non-Hispanic blacks	*	< LOD	< LOD	< LOD	< LOD	< LOD	19.4 (<LOD-25.6)	336
Non-Hispanic whites	*	< LOD	< LOD	< LOD	< LOD	16.5 (<LOD-23.3)	25.2 (14.9-46.1)	539

< LOD means less than the limit of detection, which averaged 7.5 ng/g of lipid (SD 2.4, maximum value 14.6).

* Not calculated. Proportion of results below limit of detection was too high to provide a valid result.